

Oxidation Induction Time (OIT) of polyethylene by DSC

INTRODUCTION

Oxidation induction time (OIT) is defined as the time that takes oxidation of a sample to occur under oxygen at a given temperature. Applied to polymers, this measurement enables the evaluation of its oxidative stability.

As an example, the process of aging of water pipes submitted to chlorinated water could be forecasted by performing OIT analysis. The OIT measurement is defined in the ISO11357-6 standard.

EXPERIMENT

Sample:

Fragment of Polyethylene (PE)

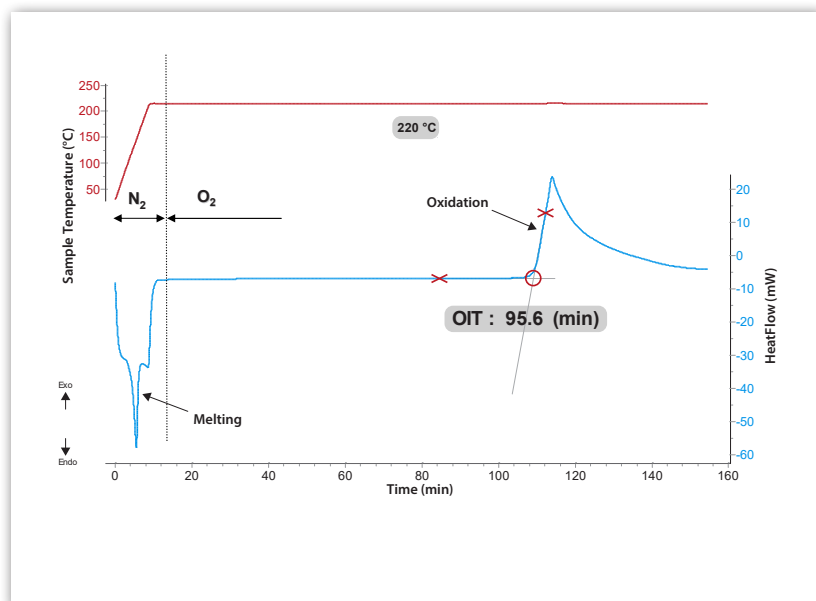
Experimental conditions:

- Atmosphere: Oxygen 20 ml/min, atmospheric pressure
- Sample mass: 15 mg in a 30 μ l aluminum crucible

Experimental procedure:

RT \rightarrow 220 $^{\circ}$ C at 50 $^{\circ}$ C/min under N₂

Isotherm at 220 $^{\circ}$ C under O₂ until the end of oxidation



RESULTS AND CONCLUSION

During the heating ramp the melting of polyethylene is observed. When the isotherm step is reached, the N₂ gas is switched to O₂ and an exothermic event occurs after a period of time: this corresponds to the beginning of the polyethylene oxidation.

The time between the introduction of oxygen and the oxidation event (measured at the peak onset) is the OIT, equal in this case to 95.6 min.

INSTRUMENT

SETLINE DSC / DSC+

-170 to 700 $^{\circ}$ C



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